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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/798,962
Filing Date: March 12, 2004
Appellant(s): COCHRAN ET AL.

Philip S. Lyren (#40,709)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10 June 2008 appealing from the Office action mailed 11 January 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interference

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2005/0038968	Iwamura et al.	2-2005
2002/0083281	Carteau	6-2002
6,912,483	Frederick	6-2005
6,260,125	McDowell	7-2001
6,098,179	Harter, Jr.	8-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims **1-4, 6, 13-17, 19** and **26-32** are rejected under 35 U.S.C. 103(a) as being anticipated by Iwamura et al. (U.S. 2005/0038968), hereinafter referred to as Iwamura et al, and in view of Carteau (U.S. 2002/0083281), hereinafter referred to as Carteau.

With respect to **claim 1**, Iwamura et al. disclose a data synchronization method for a redundant data storage arrangement in which there are at least

- o a primary storage entity (100 of Figs. 1 and 19; paragraph 0040, lines 1-2) and
- o mirroring first (170 of Figs. 1 and 19; paragraph 0040, line 2) and second (180 of Figs. 1 and 19; paragraph 0040, lines 2-3) remote storage entities in communication therewith (160 of Fig. 1, arrows indicating communication of

- Fig. 19; paragraph 0040, lines 3-4, paragraphs 0064 and 0237 describe the synchronous link between host and synchronous site; paragraph 0238 describes communication between host and asynchronous site), respectively,
- writes to the first and second remote storage entities being tracked via respective first (CL1904 of Figs. 19 and 20) and second (DL1906 of Figs. 19 and 20) sidefiles (paragraph 0245),
 - the first and second storage entities having different levels of write-currency relative to each other (paragraph 0237 describes synchronous link between host and synchronous site; paragraph 0238 describes asynchronous link between host and asynchronous site using a "DB log transmission program"),

Iwamura et al does not explicitly teach receiving acknowledgements from the second remote storage entity at both the primary storage entity and the first remote storage entity.

Carteau teach,

- receiving acknowledgements from the second remote storage entity at both the primary storage entity and the first remote storage entity (Paragraph 0027 of Carteau);

The combination of Iwamura et al and Carteau teach,

- comparing acknowledgements and sequence numbers in the first sidefile with acknowledgements and sequence numbers in the second sidefile (paragraph 0236; paragraph 0261, lines 3-7 of Iwamura et al and Paragraph 0027 of Carteau); and

- o updating writes stored at the second remote storage entity based upon the comparison of the first and second sidefiles (paragraph 0261, lines 3-7 of Iwamura et al).

Iwamura et al and Carteau are analogous art because they are from the same field of endeavor namely, data backup systems.

At the time of invention, it would have been obvious to one of ordinary skill in the art, having both the teachings of Iwamura et al and Carteau before him/her to combine the sending of acknowledgments to both the first and host computer of Carteau with Iwamura et al for the benefit of complete efficient resynchronization after a break in the mirroring process.

The suggestion for doing so would have been that, this logging allows efficient resynchronization after mirroring is broken (Paragraph 0027 of Carteau). Further, sending acknowledgements to the first controller in addition to the host computer ensures a complete log file and allows for complete confidence when a restoration is required.

The Examiner further notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. This is helpful when sensitive data

such as medical records or bank records are being transmitted. Having both acknowledgments and sequential IDs further ensures complete resynchronization of mirrors in the event mirroring is broken. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claims 1-4 and 6.

With respect to **claim 2**, the combination of Iwamura et al. and Carteau disclose wherein the updating of writes includes forwarding to the second remote storage entity writes that are present in the first sidefile but not yet present in the second sidefile (paragraph 0261 of Iwamura et al.).

With respect to **claim 3**, the combination of Iwamura et al. and Carteau disclose wherein the comparing is done on the basis of sequence numbers associated with the writes (paragraph 0236 and paragraph 0261, lines 7-12 of Iwamura et al.).

With respect to **claim 4**, the combination of Iwamura et al. and Carteau disclose establishing a communication connection between the first and second remote storage entities in response to the primary storage entity becoming inoperative (paragraphs 0244, 0251 of Iwamura et al.; when the primary site fails, the synchronous site updates the asynchronous site); wherein the comparing and updating are also performed in response to the primary storage entity becoming inoperative (paragraphs 0255-0266 of

Iwamura et al. describe updating process in response to failure, and paragraph 0261, lines 1-7 details comparing and updating).

With respect to **claim 6**, the combination of Iwamura et al. and Carteau disclose the method of claim 1 (see above paragraph 0), further comprising: adaptively adjusting the number of writes that can be stored in the first sidefile (paragraph 0266, lines 6-11 of Iwamura et al.; a copy of the extensible log file is kept in the synchronous site).

With respect to **claim 13**, the combination of Iwamura et al. and Carteau disclose a redundant data storage arrangement comprising:

- a primary storage entity (100 of Figs. 1 and 19; paragraph 0040, lines 1-2 of Iwamura et al) to forward writes to each of a mirroring first and second remote storage entity (paragraphs 0237-0238 of Iwamura et al) and (2) forward acknowledgements from the second remote storage entity to the first remote storage entity (paragraph 0027 of Carteau);
- the mirroring first remote storage entity (170 of Figs. 1 and 19; paragraph 0040, line 2 of Iwamura et al), in communication with the primary storage entity (160 of Fig. 1, arrows indicating communication of Fig. 19; paragraph 0040, lines 3-4, paragraph 0237 describes the synchronous link between host and synchronous site of Iwamura et al), which includes a first sidefile (CL1904 of Figs. 19 and 20 of Iwamura et al) via which writes forwarded from the primary storage entity are tracked (paragraph 0245 of Iwamura et al); and

- the mirroring second remote storage entity (180 of Figs. 1 and 19; paragraph 0040, lines 2-3 of Iwamura et al), in communication with the primary storage entity (160 of Fig. 1, arrows indicating communication of Fig. 19; paragraph 0040, lines 3-4; paragraph 0238 describes communication between host and asynchronous site of Iwamura et al), which includes a second sidefile (DL1906 of Figs. 19 and 20 of Iwamura et al) via which writes forwarded from the primary storage are tracked (paragraph 0245 of Iwamura et al);
- the first and second storage entities having different levels of write-currency relative to each other (paragraphs 0064 and 0237 describes synchronous link between host and synchronous site; paragraph 0238 describes asynchronous link between host and asynchronous site using a "DB log transmission program" of Iwamura et al);
- an initiating one of the first and second remote storage entities being operable to compare acknowledgements and sequence numbers in the first and second sidefiles (paragraph 0236; paragraph 0261, lines 3-7 of Iwamura et al), and invoke an updating of writes stored at the second remote storage entity based upon the comparison of the first and second sidefiles (paragraph 0261, lines 3-7 of Iwamura et al).

The Examiner notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and

acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claims 13-17, 19 and 26-27.

With respect to **claim 14**, the combination of Iwamura et al. and Carteau disclose wherein the updating is performed by the first remote storage entity, which is operable to do so by forwarding to the second remote storage entity writes that are present in the first sidefile but not yet present in the second sidefile (paragraph 0261 of Iwamura et al.).

With respect to **claim 15**, the combination of Iwamura et al. and Carteau disclose wherein each of the first and second remote storage entities is operable to preserve in the respective sidefile sequence numbers associated with the writes (paragraph 0246 of Iwamura et al.); and sort the respective sidefile according to the sequence numbers (paragraph 0261, lines 1-7 of Iwamura et al.).

With respect to **claim 16**, the combination of Iwamura et al. and Carteau disclose the redundant data storage arrangement of claim 13 (see above paragraph 0), wherein:

- the initiating one is further operable to establish a communication connection between itself and the other remote storage entity in response to the primary storage entity becoming inoperative (paragraphs 0244, 0251 of Iwamura et al.; when the primary site fails, the synchronous site updates the asynchronous site); and
- the comparison and the update are performed in response to the primary storage entity becoming inoperative (paragraphs 0255-0266 of Iwamura et al. describe updating process in response to failure, and paragraph 0261, lines 1-7 details comparing and updating).

With respect to **claim 17**, the combination of Iwamura et al. and Carteau disclose wherein the first remote storage entity is closer in proximity to the primary storage entity than the second remote storage entity (paragraph 0042, lines 5-8 of Iwamura et al.).

With respect to **claim 19**, the combination of Iwamura et al. and Carteau disclose the redundant data storage arrangement of claim 13 (see above paragraph 0), wherein: the first remote storage entity is operable to adaptively adjust the number of writes that can be stored in the first sidefile (paragraph 0266, lines 6-11 of Iwamura et al.; a copy of the extensible log file is kept in the synchronous site).

With respect to **claim 26**, the combination of Iwamura et al. and Carteau disclose wherein each of the first and second remote storage entities represents a tracked write in the first and second sidefile (paragraph 0058 of Iwamura et al.), respectively, with: location information as to where on a physical medium the write is to be performed (paragraph 0076, lines 1-5 of Iwamura et al.); actual data associated with the write that

is to be written to the physical medium (paragraph 0265, lines 1-7 of Iwamura et al.); and a sequence number uniquely associated with the write (paragraph 0076, lines 7-13, paragraph 0265, lines 1-7 both of Iwamura et al.).

With respect to **claim 27**, the combination of Iwamura et al. and Carteau disclose wherein the first remote storage entity receives writes forwarded synchronously from the primary storage entity (paragraph 0237 of Iwamura et al. describes the synchronous link between host and synchronous site); and the second remote storage entity receives writes forwarded asynchronously from the primary storage entity (paragraph 0238 of Iwamura et al. describes communication between host and asynchronous site).

With respect to **claim 28**, the combination of Iwamura et al. and Carteau disclose a data synchronization method for a redundant data storage arrangement in which there are at least

- synchronously receiving writes at the first remote storage entity that have been forwarded from the primary storage entity (paragraph 0237 of Iwamura et al. describes the synchronous link between host and synchronous site); and
- maintaining a sidefile (CL1904 of Figs. 19 and 20 of Iwamura et al.) via which are tracked items that include acknowledgements from the second remote storage entity received at both the primary storage entity and the first remote storage entity (paragraph 0027 of Carteau),
- sequence numbers assigned to writes (paragraph 0236 of Iwamura et al.),

- writes received at the first remote storage entity (paragraph 0245 of Iwamura et al.), and
- writes received at the second remote storage entity (paragraph 0245 of Iwamura et al.).
- comparing both acknowledgements and sequence numbers at the first remote storage entity to determine whether to update writes stored at the second remote storage entity after a failure of the primary storage entity (paragraph 0236; paragraph 0261, lines 3-7 of Iwamura et al and Paragraph 0027 of Carteau).

The Examiner notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claim 28.

With respect to **claim 29**, the combination of Iwamura et al. and Carteau disclose a mirroring first remote storage entity for a redundant data storage arrangement in which there are at least

- memory to store data (1903 and 1904 of Fig. 19; paragraph 0237 of Iwamura et al., *note*: elements are mislabeled as 1093 and 1094); and
- a processor (paragraph 0084 of Iwamura et al. describes how a CPU executes programs stored in subsystems, so therefore synchronous site 170 has a CPU) operable to
 - synchronously receive writes that have been forwarded from the primary storage entity (paragraphs 0064 and 0237); and
 - maintain a sidefile (1904 of Figs. 19 and 20 of Iwamura et al.) in the memory via which are tracked items that include acknowledgements from the second remote storage entity received at both the primary storage entity and the first remote storage entity (Paragraph 0027 of Carteau),
 - sequence numbers assigned to writes (paragraph 0236 of Iwamura et al.),
 - writes received at the first remote storage entity (paragraph 0245 of Iwamura et al.), and
 - writes received at the second remote storage entity (paragraph 0261, lines 1-7 of Iwamura et al.).
- compare both acknowledgements and sequence numbers at the :first remote storage entity to determine whether to update writes stored at the second remote storage entity after a failure of the primary storage entity

(paragraph 0236; paragraph 0261, lines 3-7 of Iwamura et al and Paragraph 0027 of Carteau).

The Examiner notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claim 29.

With respect to **claim 30**, the combination of Iwamura et al. and Carteau disclose

- o synchronously forwarding to the first remote storage entity writes from the primary storage entity (paragraphs 0064 and 0237 of Iwamura et al.);
- o informing the first remote storage entity regarding writes acknowledged to have been received at the second remote storage entity (paragraph 0027 of Carteau);comparing
- o the writes acknowledged to have been received (paragraph 0236 and paragraph 0261, lines 7-12 of Iwamura et al.) and

- (2) sequence numbers assigned to writes to determine data content at the second remote storage entity (paragraph 0236 and paragraph 0261, lines 7-12 of Iwamura et al.).

The Examiner notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claim 30.

With respect to **claim 31**, the combination of Iwamura et al. and Carteau disclose

- memory to store data (225A of Figs. 2, 19 and 22; paragraph 0265, lines 1-6 of Iwamura et al.); and
- a processor (111 of Fig. 1; paragraph 0047, line 1 of Iwamura et al.) operable to synchronously forward writes to the first remote storage entity (paragraphs 0064 and 0237 of Iwamura et al.);

- receive indications of writes acknowledged to have been received at the second remote storage entity (paragraph 0027 of Carteau); and
- inform the first remote storage entity regarding the indications (paragraph 0266, lines 6-11, a copy of the journal file system 2202 is kept in the synchronous site 170 of Iwamura et al.);
- assign sequence numbers to writes (paragraph 0236 of Iwamura et al.)
- send the sequence numbers to first and second remote storage entities (paragraph 0236 and paragraph 0261, lines 7-12 of Iwamura et al.).
- compare both acknowledgements and sequence numbers at the first remote storage entity to determine whether to update writes stored at the second remote storage entity after a failure of the primary storage entity (paragraph 0236; paragraph 0261, lines 3-7 of Iwamura et al and Paragraph 0027 of Carteau).

The Examiner notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claim 31.

With respect to **claim 32**, the combination of Iwamura et al. and Carteau disclose

- primary storage means (125 of Fig. 1 of Iwamura et al.) for storing writes received from a host (paragraph 0052 of Iwamura et al.);
- first remote mirror means for mirroring writes forwarded from the primary storage means (170 of Figs. 1, 19 and 22; paragraph 0040, line 2 of Iwamura et al.) and for tracking such writes via a first sidefile (CL1904 of Figs. 19 and 20; paragraph 0245 of Iwamura et al.); and
- second remote mirror means for mirroring writes forwarded from the primary storage means (180 of Figs. 1, 19 and 22; paragraph 0040, lines 2-3 of Iwamura et al.) and for tracking writes such writes via a second sidefile (DL1906 of Figs. 19 and 20; paragraph 0245 of Iwamura et al.);
- the first and second storage entities having different levels of write-currency relative to each other (paragraphs 0064 and 0237 describes synchronous link between host and synchronous site; paragraph 0238 describes communication between host and asynchronous site using a "DB log transmission program" of Iwamura et al.);
- the first sidefile including (1) sequence numbers assigned to writes (paragraph 0236 of Iwamura et al.) and

- (2) acknowledgements from the second remote mirror means (paragraph 0027 of Carteau);
- the second sidefile including sequence numbers assigned to writes (paragraph 0236 and paragraph 0261, lines 7-12 of Iwamura et al.);
- comparison means, responsive to the primary storage means being rendered inoperative, for comparing the first and second sidefiles (paragraph 0261, lines 1-7 of Iwamura et al.), and
- update means, responsive to the comparison, for updating writes stored at the second remote mirror means based upon the comparison of the first and second sidefiles (paragraph 0261, lines 1-7 of Iwamura et al.).

The Examiner notes that Iwamura et al teach comparison of sequence numbers (sequential IDs - paragraph 0236). Carteau teach the use of acknowledgements (Paragraph 0027). The only difference is the usage of both sequence numbers and acknowledgements during a restoration procedure. As Iwamura et al already relies on sequential IDs to determine missing writes, implementing the acknowledgements of Carteau into the system of Iwamura et al would ensure an even more complete record of writes. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

Therefore, it would have been obvious to combine Iwamura et al with Carteau for the benefit of complete and efficient resynchronization after a break in the mirroring process to obtain the invention as specified in claim 32.

Claims 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamura et al. (U.S. 2005/0038968) and in view of Carteau (U.S. 2002/0083281) as and further in view of Frederick (U.S. 6,912,483).

With respect to **claim 5**, the combination of Iwamura et al. and Carteau disclose configuring the first (CL1904 of Figs. 19 and 20; paragraph 0245 of Iwamura et al) and second (DL1906 of Figs. 19 and 20; paragraph 0245 of Iwamura et al) sidefiles to store a fixed number of writes therein, respectively (paragraph 0266, lines 5-8 of Iwamura et al).

The combination of Iwamura et al. and Carteau do not disclose the limitation further comprising adding a new write to the first and second sidefiles by overwriting the oldest write therein, respectively.

However, Frederick discloses the limitation further comprising adding a new write to the first and second sidefiles by overwriting the oldest write therein, respectively (column 6, lines 54-55 of Frederick).

Iwamura et al. and Carteau and Frederick are analogous art because they are from the same field of endeavor, namely data logging.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the circular logging of Frederick with the method of Iwamura et al. and Carteau for the benefit of a method with a circular log.

The motivation for doing so would have been so that "each log... has a fixed size in memory" (column 6, lines 52-53 of Frederick).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine Frederick with Iwamura et al. and Carteau for the benefit of a method with a circular log to obtain the invention as specified in claim 5.

With respect to **claim 18**, the combination of Iwamura et al. and Carteau disclose wherein the first means (170 of Figs. 1, 19 and 22; paragraph 0040, line 2 of Iwamura et al) and second (180 of Figs. 1, 19 and 22; paragraph 0040, lines 2-3 of Iwamura et al) remote storage entities are configured to store a fixed number of writes therein, respectively (paragraph 0266, lines 5-8 of Iwamura et al). Iwamura et al. also disclose the first (CL1904 of Figs. 19 and 20; paragraph 0245 of Iwamura et al) and second (DL1906 of Figs. 19 and 20; paragraph 0245 of Iwamura et al) sidefiles. wherein the first and second remote storage entities are operable to add a new write to the first and second sidefiles by overwriting the oldest write therein, respectively (column 6, lines 54-55 of Frederick).

Iwamura et al. and and Carteau Frederick are analogous art because they are from the same field of endeavor, namely data logging.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the circular logging of Frederick with the redundant data storage arrangement of Iwamura et al and Carteau for the benefit of a method with a circular log.

The motivation for doing so would have been so that "each log... has a fixed size in memory" (column 6, lines 52-53 of Frederick).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine Frederick with Iwamura et al. and Carteau for the benefit of a redundant data storage arrangement with a circular log to obtain the invention as specified in claim 18.

Claims 7-9 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamura et al. (U.S. 2005/0038968) and in view of Carteau (U.S. 2002/0083281) and further in view of McDowell (U.S. 6,260,125).

With respect to **claim 7**, the combination of Iwamura et al. and Carteau disclose the method of claim 6.

The combination of Iwamura et al. and Carteau do not disclose the limitation wherein the adaptive adjustment is based upon the writes that are stored in the second sidefile.

However, McDowell discloses the limitation wherein the adaptive adjustment is based upon the writes that are stored in the second sidefile (column 8, lines 3-6 of McDowell).

Iwamura et al. and Carteau and McDowell are analogous art because they are from the same field of endeavor, namely logging of writes in a mirrored data system.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the log file adjustment of McDowell with the method of Iwamura et al and Carteau for the benefit of a method with log file adjustment.

The motivation for doing so would have been "to keep the log file size manageable" (column 8, line 3 of McDowell).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine McDowell with Iwamura et al. and Carteau for the benefit of a method with log file adjustment to obtain the invention as specified in claims 7-9.

With respect to **claim 8**, the combination of Iwamura et al. and Carteau and McDowell teach wherein the adaptive adjustment more particularly is based upon the write stored in the second sidefile which has the oldest contiguous sequence number (column 8, lines 7-10 of McDowell).

With respect to **claim 9**, the combination of Iwamura et al. and Carteau and McDowell disclose

- identifying at least some of the writes stored in the second sidefile (DL1906 of Figs. 19 and 20 of Iwamura et al) (paragraph 0236 of Iwamura et al); and then
- accordingly informing the first remote storage entity (170 of Figs. 1 and 19; paragraph 0040, line 2 of Iwamura et al) regarding such identities (paragraph 0236 indicates that a sequential ID may be substituted for time stamps; paragraphs 0252-0254 describe how time stamps are compared by host 271 of synchronous site 170 of Fig. 19, and the sequential IDs could be substituted for time stamps, so the IDs would be transmitted to the synchronous site of Iwamura et al).

With respect to **claim 20**, the combination of Iwamura et al. and Carteau disclose the redundant data storage arrangement of claim 19.

The combination of Iwamura et al. and Carteau do not disclose the limitation wherein the adaptive adjustment is based upon the writes that are stored in the second sidefile.

However, McDowell discloses the limitation wherein the adaptive adjustment is based upon the writes that are stored in the second sidefile (column 8, lines 3-6 of McDowell).

Iwamura et al. and Carteau and McDowell are analogous art because they are from the same field of endeavor, namely logging of writes in a mirrored data system.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the log file adjustment of McDowell with the redundant data storage arrangement of Iwamura et al. and Carteau for the benefit of a redundant data storage arrangement with log file adjustment.

The motivation for doing so would have been "to keep the log file size manageable" (column 8, line 3 of McDowell).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine McDowell with Iwamura et al. and Carteau for the benefit of a redundant data storage arrangement with log file adjustment to obtain the invention as specified in claims 20-22.

With respect to **claim 21**, the combination of Iwamura et al. and Carteau and McDowell disclose wherein the adaptive adjustment more particularly is based upon the write stored in the second sidefile, which has the oldest newest sequence number (column 8, lines 7-10 of McDowell).

With respect to **claim 22**, the combination of Iwamura et al. and Carteau and McDowell disclose the primary storage entity (100 of Fig. 19, paragraph 0229, line 5 of Iwamura et al.) is operable to identify at least some of the writes stored in the second sidefile (DL1906 of Figs. 19 and 20 of Iwamura et al.) (paragraph 0236; the database 1907 of Fig. 19 creates the IDs, and is a component of the primary storage unit 100 of Fig. 19 of Iwamura et al.); and then accordingly informing the first remote storage entity (170 of Figs. 1 and 19; paragraph 0040, line 2 of Iwamura et al.) regarding such identities (paragraph 0236 indicates that a sequential ID may be substituted for time stamps; paragraphs 0252-0254 describe how time stamps are compared by host 271 of synchronous site 170 of Fig. 19, and the sequential IDs could be substituted for time stamps, so the IDs would be transmitted to the synchronous site of Iwamura et al.).

Claims 10-12 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamura et al. (U.S. 2005/0038968) and in view of Carteau (U.S. 2002/0083281) and further in view of Harter, Jr. (U.S. 6,098,179).

With respect to **claim 10**, the combination of Iwamura et al. and Carteau disclose and the first sidefile (CL1904 of Figs. 19 and 20; paragraph 0245 of Iwamura et al.) and the second remote storage entity (180 of Figs. 1, 19 and 22; paragraph 0040, lines 2-3 of Iwamura et al.).

The combination of Iwamura et al. and Carteau do not disclose the limitation further comprising: configuring the first sidefile to include a field that is used to track whether a write has been acknowledged by the second remote storage entity as having been received.

However, Harter, Jr. discloses the limitation further comprising: configuring the first sidefile to include a field that is used to track whether a write has been acknowledged by the second remote storage entity as having been received (column 7, line 65 -- column 8, line 4 of Harter, Jr.).

Iwamura et al. and Carteau and Harter, Jr. are analogous art because they are from the same field of endeavor, namely data transmission between storage entities. At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the acknowledgement field of Harter, Jr. with the method of Iwamura et al and Carteau for the benefit of a method with an acknowledgement field.

The motivation for doing so would have been to communicate "an indication as to whether the responding node's PCI/MC adapter is in a hardware error state" (column 8, lines 2-4 of Harter, Jr.).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine Harter, Jr. with Iwamura et al. and Carteau for the benefit of a method with an acknowledgement field to obtain the invention as specified in claims 10-12.

With respect to **claim 11**, the combination of Iwamura et al. and Carteau and Harter, Jr. disclose providing a third sidefile via which writes received thereby are tracked (AL 1902 of Figs. 19 and 20; paragraph 0234, lines 3-7 of Iwamura et al) and further comprising: configuring the third sidefile to include a field that is used to track whether a write has been acknowledged by the second remote storage entity as having been received (column 7, line 65 -- column 8, line 4 of Harter, Jr.).

With respect to **claim 12**, the combination of Iwamura et al. and Carteau and Harter, Jr. disclose configuring the third sidefile further to track whether a write-acknowledgement forwarded from the second remote storage entity has been acknowledged as having been received by the first remote storage entity (paragraph 0270, a write completion message is stored in journal file system 2202 on the primary storage site 110 after a write to the asynchronous site 180 of Iwamura et al.) and further comprising: configuring the third sidefile further to include a field that is used to track whether a write-acknowledgement forwarded from the second remote storage entity has been acknowledged as having been received by the first remote storage entity (column 7, line 65 -- column 8, line 4 of Harter, Jr.).

With respect to **claim 23**, the combination of Iwamura et al. and Carteau disclose and the first sidefile (CL1904 of Figs. 19 and 20; paragraph 0245 of Iwamura et al) and the second remote storage entity (180 of Figs. 1, 19 and 22; paragraph 0040, lines 2-3 of Iwamura et al).

Iwamura et al. do not disclose the limitation wherein the first sidefile includes a field that is used to track whether a write has been acknowledged by the second remote storage entity as having been received.

However, Harter, Jr. discloses the limitation wherein the first sidefile includes a field that is used to track whether a write has been acknowledged by the second remote storage entity as having been received (column 7, line 65 -- column 8, line 4 of Harter, Jr.).

Iwamura et al. and Carteau and Harter, Jr. are analogous art because they are from the same field of endeavor, namely data transmission between storage entities. At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the acknowledgement field of Harter, Jr. with the redundant data storage arrangement of Iwamura et al and Carteau for the benefit of a redundant data storage arrangement with an acknowledgement field.

The motivation for doing so would have been to communicate "an indication as to whether the responding node's PCI/MC adapter is in a hardware error state" (column 8, lines 2-4 of Harter, Jr.).

Therefore, it would have been obvious to a person of ordinary skill in the art to combine Harter, Jr. with Iwamura et al and Carteau for the benefit of a redundant data storage arrangement with an acknowledgement field to obtain the invention as specified in claims 23-25.

With respect to **claim 24**, the combination of Iwamura et al. and Carteau and Harter, Jr. disclose the primary storage entity includes a third sidefile to track writes received thereby (AL 1902 of Figs. 19 and 20; paragraph 0234, lines 3-7 of Iwamura et al) wherein: the first sidefile including a field that is used to track whether a write has been acknowledged by the second remote storage entity as having been received (column 7, line 65 -- column 8, line 4 of Harter, Jr.).

With respect to **claim 25**, the combination of Iwamura et al. and Carteau and Harter, Jr. disclose wherein the first sidefile further tracks whether a write-acknowledgement forwarded from the second remote storage entity has been

acknowledged as having been received by the first remote storage entity (paragraph 0270, a write completion message is stored in journal file system 2202 on the primary storage site 110 after a write to the asynchronous site 180 of Iwamura et al) wherein the first sidefile further includes a field that is used to track whether a write-acknowledgement forwarded from the second remote storage entity has been acknowledged as having been received by the first remote storage entity (column 7, line 65 -- column 8, line 4 of Harter, Jr.).

(10) Response to Argument

35 USC § 103(a) Rejection of Claims 1-4, 6, 13-17, 19, and 26-32

as being Unpatentable over Iwamura in View of Carteau

At pages 13-14 of the Appeal Brief filed 10 June 2008, with respect to the "Overview of Claims and Primary References (Iwamura and Carteau)," Appellant argues:

"Iwamura does not teach or suggest using acknowledgements as part of his rollback process for database recovery." and "Carteau does not teach or suggest using these acknowledgements as part of a process for database recovery."

The Examiner respectfully disagrees and wishes to note that Appellant's arguments are not commensurate in scope with the instant claim language. The Examiner notes that in response to Appellant's argument that the references fail to show certain features of Appellant's invention, it is noted that the features upon which Appellant relies (i.e., *using acknowledgements as part of a process for database recovery*) are not recited in the rejected claim(s).

At pages 14-15 of the Appeal Brief filed 10 June 2008, with respect to the rejection of **claim 1**, Appellant argues:

"Iwamura, though, never teaches or suggests comparing both acknowledgements and sequence numbers in one sidefile with acknowledgements and sequence numbers in a second sidefile as recited in claim 1. Carteau discusses transmitting acknowledges, but never teaches or suggests comparing both acknowledgements and sequence numbers in one sidefile with acknowledgements and sequence numbers in a second sidefile as recited in claim 1. The differences between the claims and the teachings in the art are great since the references fail to teach or suggest all of the claim elements. As such, the pending claims are not a predictable variation of the art to one of ordinary skill in the art."

The Examiner respectfully disagrees. In response to Appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Examiner has not relied upon Iwamura or Carteau individually, but has relied upon the combination of Iwamura and Carteau to teach the comparison of both sequence numbers and acknowledgements.

Throughout prosecution, the Examiner has relied upon Iwamura to teach sequence numbers and Carteau to teach acknowledgements. Iwamura already relies on sequential IDs in a log to determine missing writes but it is the implementation of the acknowledgements of Carteau combined with the sequential IDs in the log, that results in the comparison of both sequential IDs and acknowledgments further ensuring a complete resynchronization of mirrors in the event mirroring is broken. One of ordinary skill in the art would know that this is especially helpful, for example, when sensitive data such as medical records or bank records are being transmitted and transmission is

interrupted. Thus, employing both sequential IDs and acknowledgements for comparison would have yielded predictable results to one of ordinary skill in the art in obviating that which is instantly claimed.

At page 15 of the Appeal Brief filed 10 June 2008, with respect to the rejection of **claim 13**, Appellant argues:

"Iwamura, though, never teaches or suggests comparing both acknowledgements and sequence numbers as recited in claim 13. Carteau discusses transmitting acknowledges, but never teaches or suggests comparing both acknowledgements and sequence numbers as recited in claim 13. The differences between the claims and the teachings in the art are great since the references fail to teach or suggest all of the claim elements. As such, the pending claims are not a predictable variation of the art to one of ordinary skill in the art."

The Examiner respectfully disagrees.

At pages 15-17 of the Appeal Brief filed 10 June 2008, with respect to the rejections of **claims 28-32**, the Examiner notes that Appellant presents identical arguments as those presented above with respect to **claim 13**. In an attempt to provide compact prosecution the Examiner refers back to those arguments and responses presented *supra* regarding **claim 1**.

35 USC § 103(a) Rejection of Claims 5 and 18 as being Unpatentable

Over Iwamura in View of Carteau and Further in View of Frederick

Appellant's sole argument regarding the combination of the Iwamura, Carteau, and Frederick references relies upon Iwamura's and Carteau's alleged failure to teach independent **claims 1 and 13**. In an attempt to provide compact prosecution the Examiner refers back to those arguments and responses presented *supra* regarding **claims 1 and 13**.

35 USC § 103(a) Rejection of Claims 7-9 and 20-22 as being Unpatentable

Over Iwamura in View of Carteau and Further in View of McDowell

Appellant's sole argument regarding the combination of the Iwamura, Carteau, and McDowell references relies upon Iwamura's and Carteau's alleged failure to teach independent **claims 1 and 13**. In an attempt to provide compact prosecution the Examiner refers back to those arguments and responses presented *supra* regarding **claims 1 and 13**.

35 USC § 103(a) Rejection of Claims 7-9 and 20-22 as being Unpatentable

Over Iwamura in View of Carteau and Further in View of Harter

Appellant's sole argument regarding the combination of the Iwamura, Carteau, and Harter references relies upon Iwamura's and Carteau's alleged failure to teach independent **claims 1 and 13**. In an attempt to provide compact prosecution the Examiner refers back to those arguments and responses presented *supra* regarding **claims 1 and 13**.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Matthew Bradley/

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